
Fault detection and locating

Overlay programs

Overlay programs are used to detect most faults in the QCA144 cabinet. These programs are described in *Remote Peripheral Equipment maintenance procedures* (553-2601-500).

Alarm indications

RPE related alarms are described in *Remote Peripheral Equipment maintenance procedures* (553-2601-500). **Table 1** of this appendix gives the alarm indications and causes that are unique to the QCA144 cabinet and are not necessarily caused by a fault in the RPE.

Fault locating

Table 2 gives a cross-reference of fault indicators and associated fault type. Some faults may be cleared simply by using **Table 1**. Others are cleared by using the appropriate procedure for the type of fault indicated in **Table 1**.

Fault clearing procedures

The following procedures describe how to clear faults in the cabinet.

- CE/PE breaker trips on QUX19 unit—**Procedure 1**
- AC BRKR breaker trips on -48 V rectifier—**Procedure 2**
- PE2, PE3, PE4, or PE5 breaker trips—**Procedure 3**
- FN fuse operates or LN LED is extinguished—**Procedure 4**

Table 1
Alarm indications (Part 1 of 2)

Type of fault	Trouble indicator										
	CE/PE1 LED OFF	PE 2-5 LED OFF	RECT LED OFF	FN LED OFF	CE LN XFR ON	CAB INP OFF	REM ALARM ON	ATT MJ ALARM ON	TTY MSG	PE1 LN XFR ON	PE 2-5 LN XFR ON
+5 V	→				→		→	→	→	→	→
+12 V	→						→	→	→		
+10 V PE1 +6 V	→						→	→	→	→ (Note)	
+15 V PE1 -15 V	→						→	→	→		
-12 V	→						→	→	→		
-10 V PE1 -6 V	→						→	→	→	→ (Note)	
-48 V PE1	→						→	→	→	→ (Note)	
-52 V AL (-47 V)	→						→	→	→		
-52 V TRIP (-42 V)	→	→	→	→	→	→	→	→	→	→	→
86 V RMS	→						→	→	→		
DCON Rectifier			→				→	→	→		
Note: Individual shelf transfer if +10, -10, or -48 volts fail on shelf power converter.											

Table 1
Alarm indications (Part 2 of 2)

Type of fault	Trouble indicator										
	CE/PE1 LED OFF	PE 2-5 LED OFF	RECT LED OFF	FN LED OFF	CE LN XFR ON	CAB INP OFF	REM ALARM ON	ATT MJ ALARM ON	TTY MSG	PE1 LN XFR ON	PE 2-5 LN XFR ON
PE power from second and third tier PE 2-5	—	→	—	—	—	—	→	→	→	—	→ (Note)
Manual line transfer	→	—	—	—	→	—	→	→	→	→	→
–150 V	→	—	—	—	—	—	→	→	→	—	—
Temp	→	→	→	→	→	→	→	→	→	→	→
Fan	—	—	—	→	—	—	→	→	→	—	—
Fuse	→	—	—	—	—	—	→	→	→	—	—
QBL24	—	—	→	—	—	—	→	→	→	—	—
Note: Individual shelf transfer if +10, –10, or –48 volts fail on shelf power converter.											

Table 2
Fault indicators and possible causes (Part 1 of 2)

Fault indication	Possible cause
CE/PE LED Extinguished	— Check QUX19 unit for tripped breaker. — Check for a blown fuse on the QUAA3 and QUX19 units. — Check connector PE1 on shelf backplane for a short or defective wiring. — Check for a defective QPC705 (required if bottom PE shelf is equipped with message waiting line card). — Check LN XFR switch on faceplate of QUAA3 unit and ensure that it is set to 0. Wait 2 minutes for fault indication to clear. — Press –48 V CLR button on QUAA3 unit. If fault does not clear, replace the following items until fault clears: • QPC705 (if equipped) • QPC659 in PE shelf in first tier • QUAA3 power unit
RECT/BATT LED Extinguished	— Check for tripped AC BRKR breaker on the –48 V rectifier. — Check for a blown fuse in the QBL15 battery unit (if provided). — Check for a tripped breaker on the QBL24 battery unit (if provided). A tripped breaker on the QBL24 unit indicates defective batteries or a defective QBL24 unit.
PE2-5 LED Extinguished	— Check for tripped PE2, PE3, PE4, or PE5 breaker on QUX20 unit. — Check for extinguished LED on QPC706 or QPC659 circuit pack on the PE shelves. Replace pack with extinguished LED.
FN LED Extinguished	— Check FN fuse on QUX19 unit.
LED Extinguished on QPC705 Power Converter	— Press the –48 V CLR button on the QUAA3 unit. — The QPC705 or the cable connecting it is defective. Replace the following items until the fault is cleared. • Replace the QPC705 • Replace the cable connecting the QPC705

Table 2
Fault indicators and possible causes Part 2 of 2)

Fault indication	Possible cause
LED Extinguished on QPC706 Power Converter	— Check for tripped breaker on QUX20 unit. — Check circuit packs on affected shelf by unseating all packs, resetting the power and reinserting packs one at a time. If all circuit packs are good, replace the following items until fault is cleared: • Affected QPC706 converter • Caution: Corresponding breaker on QUX20 unit(Figure 5) must be set to OFF before removing or inserting a QPC706 converter. • Power distribution cable going to shelf • QUX20 unit
DC ON LED Extinguished	— Check commercial ac power supply. — Check DC BRKR on QBL24 battery box (if equipped). — Check F1 and F2 fuses (if equipped) or B-4 V rectifier. If blown, replace rectifier.
LED Lit on Power Fail Transfer Unit (PFTU)	— At the local site, load program 35 and enter command CMAJ. — If fault does not clear, check the following at the local site: • Cable on faceplate of PFTU and ensure that it is secure • Check transfer switches on underside of consoles • Check P10 cable connections at cross-connect terminal • Check wiring to consoles • If fault persists, replace PFTU

Procedure 1
CE/PE1 breaker on QUX19 unit trips

Step	Action	Verification
1	Reset breaker.	If breaker does not trip, fault has cleared. If breaker trips, proceed with next step.
2	Unseat the QPC659 buffer pack in the PE shelf in the first tier (base) of the cabinet. Reset breaker.	If breaker trips, replace power distribution cable at rear of cabinet. If breaker does not trip, proceed with next step.
3	Set breakers to OFF. Unseat all remaining circuit packs from PE shelf. Set breaker to ON.	If breaker trips, replace the shelf backplane.
4	Set breaker to OFF. Inset QPC659 pack. Reset breaker ON.	If breaker trips. replace defective QPC659 pack.
5	Reinsert circuit packs one at a time until circuit breaker trips.	If breaker trips when a pack is inserted, it is defective. Replace pack.

Procedure 2
AC BRKR breaker on –48 V rectifier trips

Step	Action	Verification
1	Reset breaker.	If breaker does not trip, fault has cleared. If fault reoccurs, replace the following items in the order shown until the fault clears: — The –48 V rectifier — The batteries (if equipped) — The QBL24 battery box (if equipped) — The QUAA3 power unit — The QUX19 power unit — The QUX20 power unit (if equipped)
2	Disconnect red and black wires from TB3 at rear of rectifier. Reset breaker.	If breaker trips, replace defective –48 V rectifier.
3	Set breaker to OFF and reconnect wires.	
4	Disconnect red and black wires from TB1 at rear of QUX19 unit. Reset breaker.	If breaker trips and no batteries are provided, the fault is in the red and black wiring between TB3 of the rectifier and TB1 of the QUX19 unit. Repair wiring.
5	Set the DC BRKR breaker on the QBL24 battery unit to OFF. Reset breaker.	If breaker trips, replace the QBL24 battery box. If breaker does not trip, replace the batteries.

Procedure 3

PE2, PE3, PE4, or PE5 breaker trips

Step	Action	Verification
1	Reset breaker.	If breaker does not trip, fault is cleared.
2	Check for extinguished LED on QPC706 pack associated with tripped breaker and replace pack. Reset breaker.	If breaker does not trip, fault is cleared.
3	Unseat all circuit packs on the shelf except the QPC706 pack. Reset breaker.	If breaker trips, replace power cabling to shelf at rear of cabinet. If breaker still trips when reset, replace the QUX20 unit.
4	Insert circuits one at a time until breaker trips.	Last circuit pack inserted is defective. Replace.

Procedure 4

FN fuse operates or FN LED is extinguished

Step	Action	Verification
1	Remove rear EMI shields (if equipped) and check connector J7 at rear of QUAA3 unit. Connection should be secure.	
2	Ensure that FN fuses are not blown or defective.	If fuse blows when replaced, replace fan units one at a time. If fault persists, replace cabling to cooling units at rear of cabinet followed by QUX19 unit.
3	If fuses are good and FN LED is not lit, replace QUAA3 unit.	

Note: When not equipped with cooling units, the cable from the QUX19 unit should be connected to J7 on the QUAA3 unit. When cooling units are equipped, J7 is connected to the cabinet wiring leading to the cooling units.